

Course Title: **Compilers and Languages**
Date: 25.11.2014 (First term)

Course Code: CCE3113 3rd year
Allowed time: 1 hrs

The answer: :

Total Marks: 20 Marks

Question No. 1

(4 marks)

1. What is an ambiguous grammar? Illustrate with an example. (2 marks)

A grammar is *ambiguous* if it has more than one parse tree for the same input string.

Example

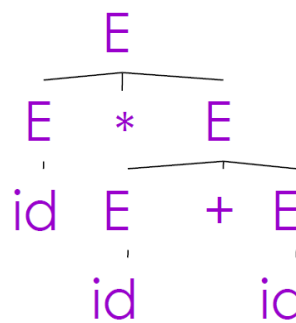
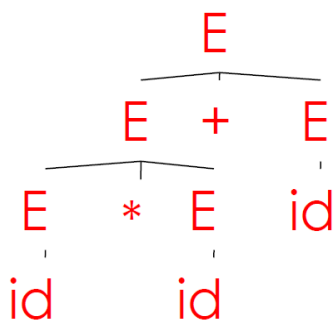
Grammar

$E \rightarrow E + E \mid E * E \mid (E) \mid id$

Input string

$id * id + id$

This string has two parse trees

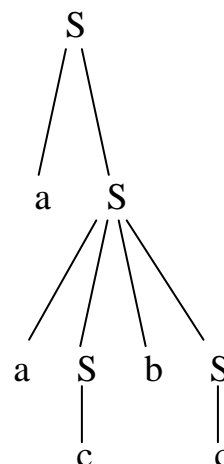
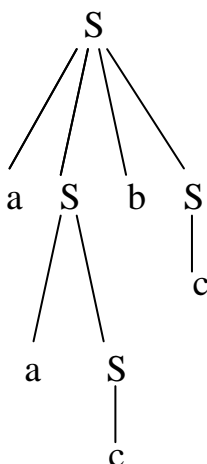


2. Show that the following grammar is ambiguous.

$S \rightarrow aSbS \mid aS \mid c$

(2 marks)

Assume the input string $aacbc$



Question No. 2

(8 marks)

1. Consider the following grammar:

(4 marks)

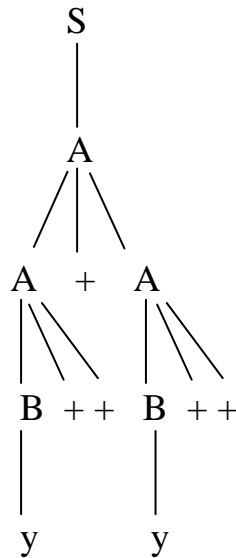
$S \rightarrow A$

$A \rightarrow A+A \mid B++$

$B \rightarrow y$

a) Draw the parse tree for the input “y + + + y + +”

(2 marks)



b) Show a leftmost derivation of “y + + + y + +”

(2 marks)

$S \rightarrow A$

$\rightarrow A+A$

$\rightarrow B+++A$

$\rightarrow y+++A$

$\rightarrow y+++B++$

$\rightarrow y+++y++$

2. Write a regular expression for all strings of a's and b's which contains the subsequence abba.

(2 marks)

$(a \mid b)^* a (a \mid b)^* b (a \mid b)^* b (a \mid b)^* a (a \mid b)^*$

3. Write a regular expression for all strings of x's and y's where every y is immediately followed by at least 3 x's.

(2 marks)

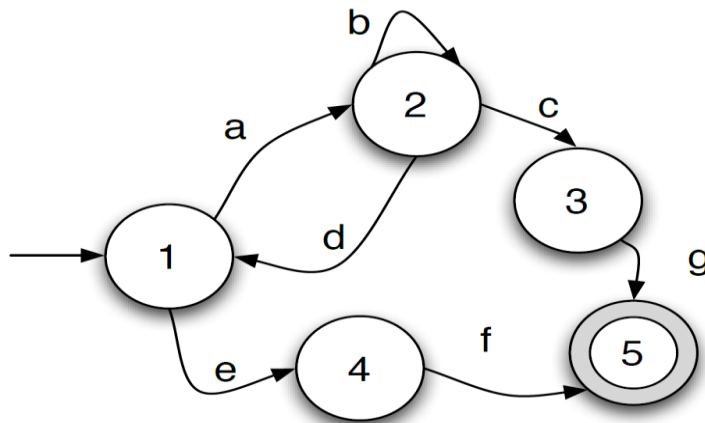
$(x \mid (yxxx))^*$

Question No. 3

(8 marks)

1. Convert the following NFA to a regular expression :

(2 marks)

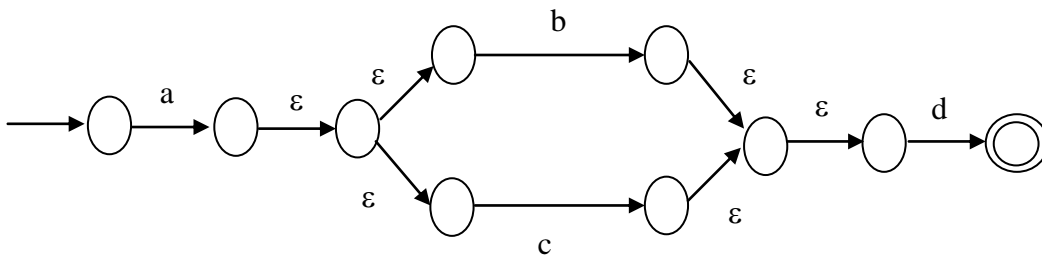


The regular expression is $(ab^*d)^* ((ab^*cg) | (ef))$

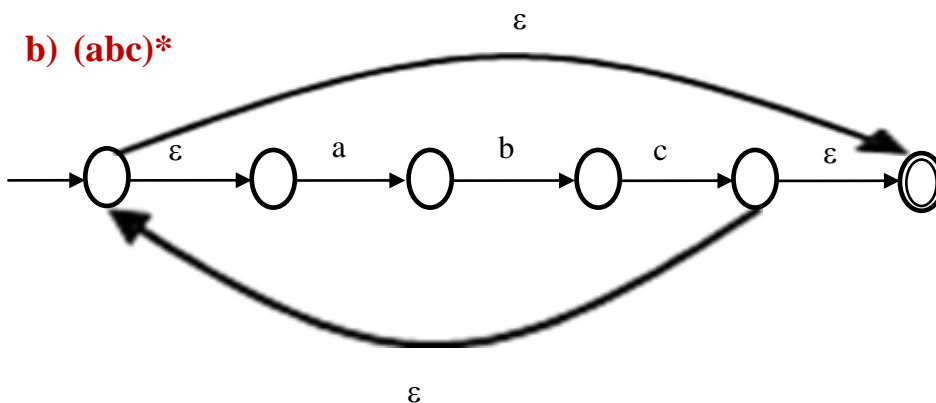
2. Draw an NFA for the following regular expressions:

(4 marks)

a) $a(b | c)d$

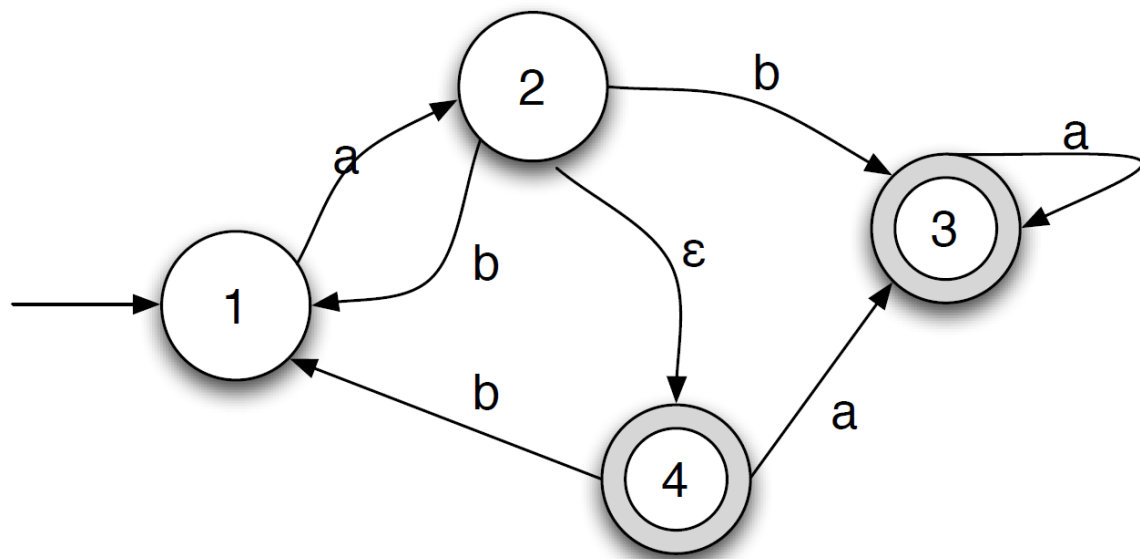


b) $(abc)^*$

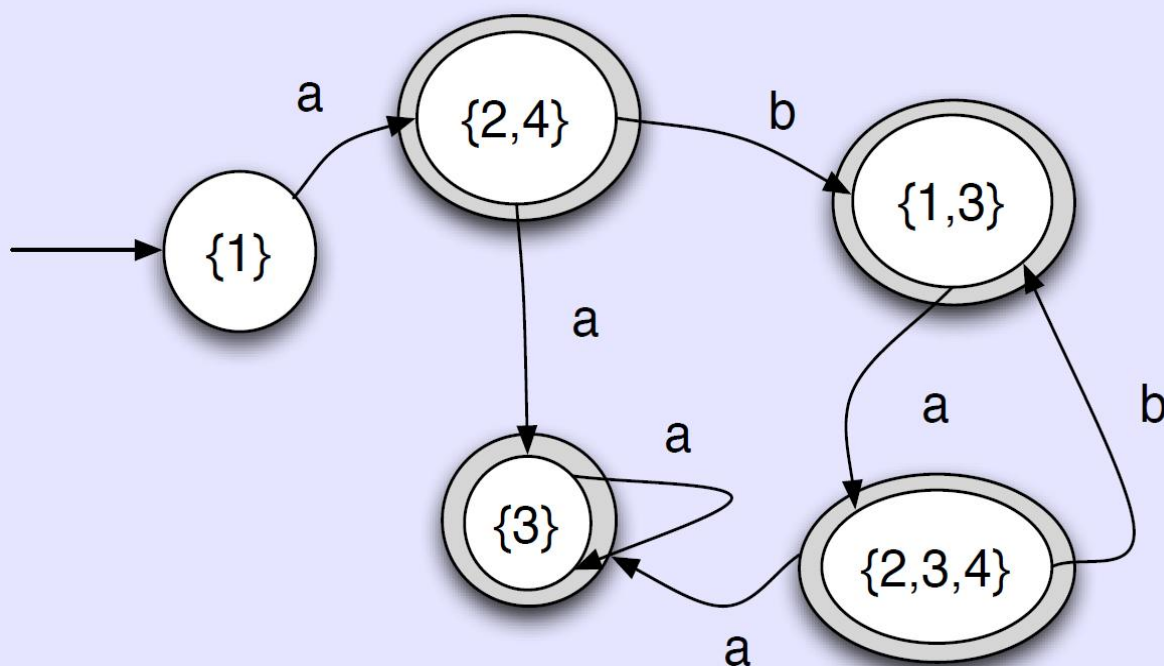


3. Convert the following NFA to a DFA:

(2 marks)



Answer:



Best wishes

Dr. Sherin El Gokhy